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## Fast Mapping in Children with Learning Disability

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### Abstract

Learning disability is a heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning or mathematical abilities. These disorders are intrinsic to the individual and presumed to be due to Central Nervous System Dysfunction. Even though a learning disability may occur concomitantly with other handicapping conditions (e.g. sensory impairment, mental retardation, social and emotional disturbance) or environmental influences (e.g. cultural differences, insufficient/inappropriate instruction, psychogenic factors) it is not the direct result of those conditions or influences (National Joint Committee on Learning Disabilities 1980). This disorder can make it problematic for a person to learn as quickly or in the same way as someone who is not affected by a learning disability. People with a learning disability have trouble performing specific types of skills or completing tasks.

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Dollaghan (1987) describes fast mapping as "a lexical acquisition strategy in which a listener rapidly constructs a representation of an unfamiliar word on the basis of a single exposure to it. This initial representation might contain information on semantic, phonological, or syntactic characteristics of the new lexical item, as well as non-linguistic information related to the situation in which it is encountered".

**Aim:** The present study was taken up with the aim of understanding the nature of fast mapping in children with learning disability.

**Method:** the participants were 30 normal children (15 Males and 15 Females) without any speech and language problems and 15 children (7 Females and 8 Males) diagnosed as having learning disability. The material used for the study was 20 familiar words and 10 novel words. Fast mapping ability for the novel words were compared between the normal children and children with learning disability.

**Results:** Results indicated that there is a significant difference in fast mapping skills between normal and children with learning disability. Children with learning disability had poorer performance compared to that of normal.

**Keywords:** Learning Disability, Fast Mapping, Lexicon.

## Introduction

Language is an essential aspect of human interaction and transmission of information. It may be defined as "a socially shared code or conventional system for representing concepts through the use of arbitrary symbols and rule governed combinations of those symbols" (Owens, 1996). The ability to use the vocal apparatus to express the feeling, describe an event and to establish communication is unique to human beings. Language can be divided into three major components: form, content and use (Bloom & Lahey, 1978). Speech is the dynamic production of sounds for oral communication. Van Riper (1990) defines "speech as the audible manifestation of language".

Many theories have been described over the years as to the relationship between speech, language and reading. Dechant (1964) stated that both reading and speech require an association between the experience and the symbol. The child must have meaning in spoken context before learning it and read it with naming. Betts (1946) pointed out that speech is an aid in learning to read and that speech patterns contribute to or impede the development of reading ability. Similarly, good language development is essential for good reading, for a good vocabulary and the ability to use the language is basic to the process of learning to read.

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An important area of concern in the field of language disabilities is the co-occurrence of language disorders and learning disabilities. According to Hammil, Leigh, McNutt & Larsen (1981) “ Learning Disabilities is a generic term that refers to a heterogenous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning or mathematical abilities. These disorders are intrinsic to the individual and presumed to be due to central nervous system dysfunction. Even though a learning disability may occur concomitantly with other handicapping conditions (e.g., sensory impairment, mental retardation, social and emotional disturbance), or environmental influences (e.g., cultural differences, insufficient/inappropriate instruction, psychogenic factors), it is not the direct result of those conditions or influences”.

Research shows that children with learning disabilities have problem in expressive and receptive language characteristics. In fact, many argue that a language disorder is at the core of learning disability. Children who are late in developing language were once seen as experiencing temporary delays that would resolve spontaneously over time. However, Snyder (1980) predicted that the language delayed preschooler of today may well become the learning-disabled student of tomorrow. It is important to identify language problems because many note that language problems are directly related to academic areas particularly reading (Vogel, 1975). Language has many components including phonology, morphology, syntax, semantics and pragmatics.

Semantics is a system of rules governing the meaning or content of words and word combination (Owens, 2005). Knowledge of semantic features provides a language user with a rich vocabulary of alternative meaning. The first dimension of the semantics is word meaning. The collection of words learned by individual is referred to as their vocabulary. A related term, lexicon, refers to all morphemes, including words and word parts of a language (Mc Laughlin, 2006). The ability to learn new words is central to becoming a skilled language user (Gathercole & Baddeley,1993). It was stated that perhaps the most important cognitive function for a developing child is the learning of vocabulary in their native language, and that vocabulary knowledge continues to be important as children and their language abilities develop (Gathercole & Baddeley, 1993).

Precise, objective understanding of the underlying process that drive children’s rapid vocabulary development is not clear (Mc Laughlin, 2006). It has been hypothesized that, the ability to learn and attain new words with only minimal exposure is known as fast mapping (Carey & Bartlett, 1978). Dollaghan (1987) describes fast mapping as "a lexical acquisition strategy in which a listener rapidly constructs a representation of an unfamiliar word on the basis of a single exposure to it. This initial representation might contain information on semantic, phonological, or syntactic characteristics of the new lexical item, as well as non-linguistic information related to the situation in which it is encountered".

Carey (1987) proposed that children learn the meaning of a word in two separate phases, first phase is the fast mapping phase, in which the child establishes an initial link between word

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and referent when exposed to a new word and in the second phase subsequent slow mapping/extended mapping occurs. In fast mapping phase, a child has only partial knowledge of the meaning of the word, whereas in the second phase of acquisition, this information will be gradually expanded and modified as additional experiences with that word clarifies its full meaning (Carey, 1978), eventually resembles the adult meaning. This second stage might be a prolonged process, extending months or even years. Fast mapping is regarded as the initial phase in the more extended process of lexical acquisition. Many research have been carried out as an extension of Carey and Bartlett's work (1978) to provide an explanation for fast mapping, and on examining its role in word learning. These studies also show that children are generally good at referent selection, when a novel target is given. Carey and Bartlett (1978) stated that fast mapping was found to be a valid technique for teaching new vocabulary in typically developing children. Various studies have been carried out regarding fast mapping skills in different clinical populations.

Dollaghan, C. A. (1987) studied fast mapping skills of a group of 11 normal children (ages 4:0-5:6) and compared to those of a group of 11 language-impaired children (ages 4:1-5:4) exhibiting expressive syntactic deficits. Normal and language-impaired subjects did not differ in their ability to infer a connection between the novel word and referent, to comprehend the novel word after a single exposure, and to recall some nonlinguistic information associated with the referent. However, the language-impaired subjects were less successful than the normal subjects in producing the new word, recalling significantly fewer of its three phonemes.

Rice, M. L., Buhr, J. C., & Nemeth, M. (1990) studied fast mapping skills of language-delayed 5-year-old children and compared to two groups, one matched for chronological age (CA) and the other matched for mean length of utterance (MLU). All three groups indicated fast mapping of unfamiliar words, although the language-delayed children scored lower than the MLU-matched group, who in turn scored lower than the CA-matched group. Rice, M. L. (1992) compared Language impaired preschoolers with age and language matched normal peers, the results indicated that that LI children have limited fast mapping ability.

Wilkinson & Green (1998) studied fast mapping skills for subjects who were diagnosed with moderate to severe mental retardation. Eight out of ten individuals fast mapped both novel words presented. Individuals with little expressive language were able to benefit from fast mapping via this approach. Wilkinson (1998) undertook a study investigating the use of the fast-mapping technique in increasing the vocabulary in individuals with moderate to severe learning difficulties. The majority of participants who had some receptive language skills were able to learn multiple words receptively. There is some evidence that this technique is best suited to individuals who demonstrate comparable expressive and receptive language skills.

Gray, S. (2003) studied 30 preschool children with specific language impairment (SLI) and 30 age-matched controls with normal language (NL) and compared the group performance and examined the relationship between fast mapping and word learning and between

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comprehension and production of new words. The groups performed similarly on the fast-mapping task. The NL group comprehended and produced significantly more words than the SLI group, and did so in fewer trials. Alt and Plante (2006) compared children with SLI to that of normal and results revealed that children with SLI performed poorly when mapping lexical labels and nonverbal semantic features during a fast mapping task. This suggests that children with SLI have word learning difficulties related to lexical information and nonverbal semantic features.

From the review it is found that fast mapping skills have been studied in various clinical populations, whereas, there is dearth of information in this regard in children with learning disability. Children with learning disabilities have problem in expressive and receptive language characteristics. In fact, many argue that a language disorder is at the core of learning disability. Children who are late in developing language were once seen as experiencing temporary delays that would resolve spontaneously over time. Fast mapping is one of the primary processes by which young children acquire their vast vocabularies. Hence, this study was taken up with the aim of understanding the nature of fast mapping in children with learning disability.

The purpose of the study was to shed light on the fast mapping skills in children with learning disability. The main question was whether children with learning disability rapidly create lexical representations for the unfamiliar words they encounter. Therefore, before carrying out the study it was hypothesized that there will be statistically significant difference between children with learning disability compared to normal peers.

## **Method**

### *Participants*

There were 45 children participated in the study. All the individuals were native speakers of Kannada, in the age range of 10 to 13 years. The participants were further divided into two groups. Group I consisted of 30 normal children (15 Males and 15 Females) without any speech and language problems. Group II had 15 children (7 Females and 8 Males) diagnosed as having learning disability. The diagnosis of LD was made by a qualified speech language pathologist based on early reading skills.

### *Stimuli*

There were 20 familiar and 10 unfamiliar words which served as stimuli. For the selection of these stimuli a preliminary study was carried out in children in the age range of 9 to 12 years. The participants of the preliminary study were not considered for the main study. Initially, for the selection of familiar words 40 pictures of common objects and animals were selected from the books of kindergarten. These pictures were presented through the Microsoft power point slide show. The children were instructed to name the pictures as and when they were shown. The 20 objects which the children could name successfully all the time were selected

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under familiar word category. Similarly for the selection of unfamiliar words 20 pictures were selected from the books of higher grades. The names of the 10 objects which the children failed to name all the time when presented were selected for the unfamiliar category. After the unfamiliar pictures were selected from the preliminary study each picture was given one novel word. The novel words created were having phonological composition of Kannada language. Hence, thirty color pictures served as stimulus for the study.

### *Testing procedure*

A classroom which was away from the distractive environment of the school was selected. Each participant was seated comfortably on a chair beside the investigator. The testing procedure consisted of three tasks.

#### **Task 1: Identification of referent**

Each child was shown three pictures (two familiar and one unfamiliar) in Microsoft PowerPoint slide show. The experimenter named each picture and the child was instructed to point soon after it was named.

#### **Task2: Word learning and immediate naming**

Referent identification task was followed by a training phase. In this phase the unfamiliar (target) words were presented through Microsoft PowerPoint slide show. Experimenter named each of the target word for three to four times. The child and the experimenter jointly focused on the stimuli. In each session, a total of five target words were taught to the child and asked for recall after a gap of ten minutes. In the next session, the child was taught the rest of the target words (i.e., five words) followed by a recall after ten minutes. Thus, every child would participate in learning and immediate naming for two sessions had five words in each session.

The pictures which the child could not name were re-trained.

#### **Task3: Naming after one week (retention task)**

In this task the retention of the unfamiliar words that learnt in the training session was assessed. The task was carried out one week after the training session. To accomplish this task each child was shown the pictures of the target words which they had seen previously during the learning phase. The stimuli were presented in random order which was completely different from the previous sessions. The participants were instructed to name the pictures soon after they were presented. Each correct response was given a score of one.

Responses of task 3 were noted down and subjected to statistical analysis. The statistical analysis was carried out using the Statistical Package for Social Sciences version 16.0 for

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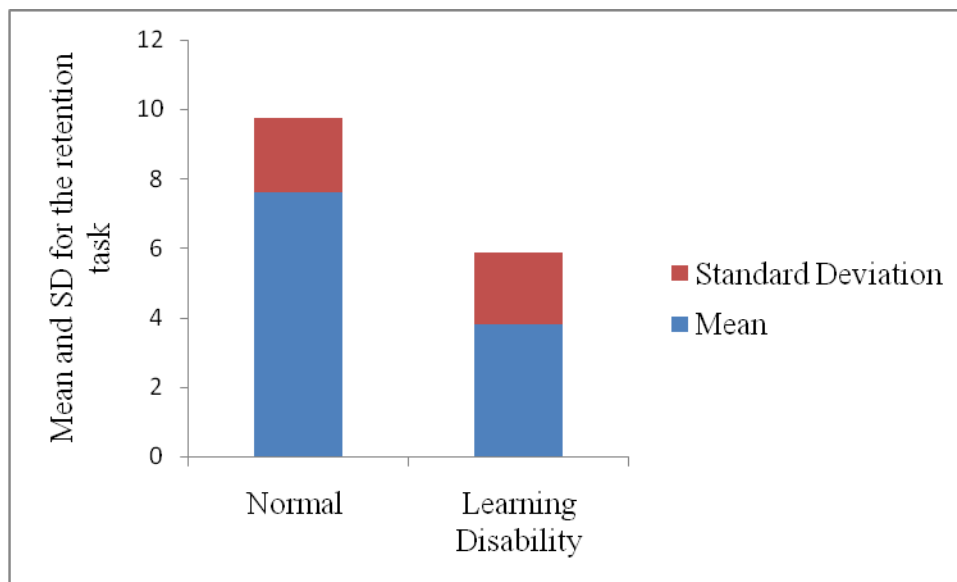
windows. Mean and standard deviation were extracted. Independent t-test was carried out to find the significance between normal children and children with learning disability.

## Results and Discussion

The mean score of retention was calculated from both normal children and children with learning disability. From table 1 and graph 1, it is evident that mean scores were more for normal children i.e. 7.6 compared to children with learning disability i.e.3.8. Further, scores obtained for both the groups were compared using independent t-test. The results showed that there is statistically significant difference ( $p < 0.05$ ) in the performance between both the groups.

**Table 1:** Mean score and standard deviation for naming task after one week

	Mean	Standard Deviation
Normal	7.6	2.13
Learning Disability	3.8	2.08



**Graph I:** Mean score and standard deviation for naming task after one week

The mean score of retention was calculated in males and females from both clinical and control group. From table 2 and graph 2, it is evident that mean scores for naming task after one week were slightly more for females compared to males in both normal and children with learning disability. The results of independent t-test showed that there is no statistically significant difference ( $p > 0.05$ ) between genders for both groups.

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Table 2: Mean score and standard deviation for naming task after one week across gender.

Group	Gender	mean	Standard Deviation
Normal	Females	8.0	1.96
	Males	7.2	2.25
Learning disability	Females	4.4	2.31
	Males	3.3	1.82

In the present study there was a significant difference in fast mapping skills between children with learning disability and normal children. Children with learning disability have limited fast mapping skills compared to that of normal. The possible reason for this could be that, children with learning disability have limited linguistic processing skills, limited general linguistic knowledge, and limited vocabulary. This will result in inability to rapidly process incoming linguistic information, to detect linguistic patterns, compare with their own lexicon, and quickly assign a tentative meaning to a word. A large number of memory studies undertaken with children exhibiting reading deficiencies have shown consistently that, these children, relative to their peers without disability, have difficulty with short term verbal memory tasks. These children exhibit difficulty on a large number of short term memory tasks that require recall of letters, digits, words or phrases in exact sequence (Corvin, 1974; Lingren & Richman 1984; Mc Keever & VanDenventer, 1975; Ritchie & Aten, 1976). Research has shown that children with learning disability have poor phonological working memory, because of which this clinical group will have problem in retaining the information in the memory.

### Conclusion

Fast mapping as "a lexical acquisition strategy in which a listener rapidly constructs a representation of an unfamiliar word on the basis of a single exposure to it. From the results of the present study it can be concluded that fast mapping skills are limited for children with learning disability compared to that of normal. Fast mapping is very essential for the development of vocabulary. The delayed speech and language skills in children with learning disability could be because of their limited ability to fast map novel words. The results will add to our knowledge of linguistic processing capabilities of LI preschoolers, in the domain of word acquisition.

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